International Journal of Medicine
and Pharmaceutical Science (IJMPS)
ISSN (P): 2250–0049; ISSN (E): 2321–0095
Vol. 9, Issue 6, Dec 2019, 39–46

TRANS STELLAR
•Journal Publications •Research Consultancy

Original Article

A CROSS-SECTIONAL STUDY OF PULMONARY FUNCTION TESTS IN TYPE 2 DIABETES MELLITUS AND CORRELATION WITH GLYCEMIC INDEX AND DURATION OF DIABETES

Dr. SONALI S. PANDE[1] & Dr. ARUN CHUTANI[2]

[1]*Associate Professor, Department of Physiology, TNMC & BYL Nair Ch Hospital, Mumbai, India*

[2]*Resident, Internal Medicine, Vincent Medical Center, Toledo, Ohio, USA*

ABSTRACT

BACKGROUND

Diabetes mellitus is a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia and complicated by involvement of many organs like cardiovascular system, nervous system, renal system and respiratory system.

AIMS AND OBJECTIVES

The study was undertaken to study various pulmonary function parameters in type 2 diabetic patients and compare them with matched healthy subjects and study its association with the duration of diabetes and glycosylated hemoglobin (HBA1c).

MATERIALS AND METHODS

Pulmonary function tests (PFTs) were recorded in type 2 diabetic patients and normal healthy controls, 72 males in each group, aged 35-55 years using Medspiror (computerized spirometer). PFT parameters, which were recorded were - FVC, FEV1, FEV1%, MMEFR 25-75%, MMEFR 0.2-1.2 L, PEFR, FEV3 and MVV. PFTs of diabetic patients and controls were compared by applying student's unpaired t test. Association of PFTs with HbA1c and duration of illness in diabetic patients was analyzed by applying Pearson's correlation coefficient.

RESULTS

There was a significant decrease in FVC, FEV1 and FEV1% in type 2 diabetic patients when compared with the healthy controls, whereas the other PFT parameters, MMEFR 25-75%, MMEFR 0.2-1.2L, PEFR and MVV did not show significant changes when compared to the control group. The impairment in pulmonary function was found to be more marked with the duration of diabetes and increased levels of glycosylated hemoglobin.

CONCLUSION

The present study is suggestive of impairment in pulmonary functions (restrictive type). Also all the lung function parameters, except MMEFR 0.2-1.2 L had a positive correlation with the duration of diabetes and HbA1c (glycosylated hemoglobin).

KEYWORDS: Pulmonary Function Tests, NIDDM, Type 2 Diabetes Mellitus & HbA1c

Received: Sep 08, 2019; **Accepted**: Sep 28, 2019; **Published**: Nov 11, 2019; **Paper Id.**: IJMPSDEC20195

INTRODUCTION

Diabetes is one of the most common metabolic disorders with an increasing incidence and prevalence in Asian Indians.[1] Diabetes is a complex syndrome characterized by hyperglycemia secondary to deranged secretion and action of insulin. It leads to specific microvascular complications (retinopathy and nephropathy), macrovascular complications

(accelerated atherosclerosis) and a variety of other complications, like neuropathy and increased tendency to infection. According to the Diabetes Atlas 2006, published by the International Diabetes Federation, the number of people with diabetes in India is expected to rise to 69.9 million by 2025. Type 2 diabetes mellitus is the most common form of diabetes and is characterized by disorders of insulin action and insulin secretion, either of which may be the predominant feature. The chronic hyperglycemia of diabetes is associated with damage and failure of various organs, especially the eyes, kidneys, nerves, heart, respiratory system and vascular system. Various pulmonary complications have been reported in type 1 diabetes mellitus, like reduced elastic lung recoil, reduced diffusing capacity, increased incidence of viral and bacterial infections.[2]Most of the literature available on the investigations of lung functions on diabetes mellitus have reported abnormalities related to both ventilatory mechanics and pulmonary diffusion. However, less is known about the pulmonary complications in type 2 diabetes mellitus, who are on oral hypoglycemic drugs for control of diabetes and its correlation with HbAc1 and duration of diabetes.

AIMS AND OBJECTIVES

- To study and compare the pulmonary functions in subjects with type 2 diabetes mellitus/NIDDM (study group) with non-diabetic subjects (control group).
- To study the correlation of PFT parameters with glycosylated hemoglobin and duration of diabetes in type 2 diabetes mellitus (study group).

MATERIALS AND METHODS

The present study was conducted in a tertiary hospital, in type 2 diabetic patients attending the diabetic clinic, after approval by institutional ethical review committee. The present study comprised of two groups:

Group 1: Study group comprised of 72 male patients of the age group 35–55 years, attending diabetic clinic and on oral hypoglycemic drugs for control of diabetes. Subjects were followed up for a duration of 1½ years.

Group 2: Control group comprised of 72 healthy male subjects of the age group 35–55 years. They were randomly selected from the general population. Their fasting and post meal blood sugar levels were determined.

Both the groups were non-smokers and free from any respiratory or cardiac disorders, which could affect lung functions. Informed written consent was obtained followed by a detailed personal, family history and systemic examination.

STUDY PROTOCOL

Anthropometric Measurements

- **Age:** was recorded from birthday by calendar to the nearest of year (< 6 months and > 6 months)
- **Height:** It was measured in cm, with the help of height measurement stadiometer.
- **Body Weight**: It was measured in kg, by portable human weighing machine.
- **Body mass index:** Was calculated by the formula BMI = Weight (in kg)/Height (in m^2). All the subjects in the study had BMI above 25.

Biochemical Parameters

The biochemical parameters were estimated in the clinical biochemistry laboratory using commercial kits adapted to auto analyser. Under all aseptic precautions, 2 ml of venous blood was collected in ethylenediaminetetraacetic acid (EDTA) bulb in all the diabetic patients. HbA1c of all the patients was estimated by ion exchange resin method by the diagnostic glycohemoglobin kits of Asritha Diatech, as per the guidelines provided.[3] HbA1c was used as an index of diabetic control over the last three months. Values over 7.5% were considered as poor glycemic control and lower than this level was considered as good glycemic control.

Fasting and postprandial blood glucose was estimated by glucose oxidase peroxidase method.[4] The oral glucose tolerance test (OGTT) was done for the control group to exclude diabetes. Only those controlled subjects with a normal fasting blood glucose of < 110 mg/dL and two hours post oral glucose of < 140 mg/dL were selected for the study. Fasting blood glucose of ⩾ 126 mg/dL was used to define diabetes.

Respiratory Parameters

Pulmonary function tests were done on a computerised spirometer, in a separate quiet room. This spirometer provides detailed analysis of observed and predicted values. To avoid diurnal variation, all the subjects in the study group were asked to report with light breakfast in the morning hours between 10 to 12 noon. They were asked to avoid beverages like tea, coffee and other stimulants. The technique of performing FVC (maximum inspiration followed by fast forceful expiration) was demonstrated to all subjects in standing position with the nose clip held in position. To get familiar with the procedure, self-demonstration was given and the subjects were asked to give few practice blows. Only when subjects were familiar with the procedure, three consecutive readings were obtained, out of which, one of the best was selected (based on the criteria of American Thoracic Society).[5] Following parameters were recorded on the spirometer: FVC, FEV_1, FEV_1%, MMEFR $_{25\text{-}75\%}$, MEFR $_{0.2\text{-}1.2L}$ and PEFR. After a rest of 10 minutes, test to obtain maximum voluntary ventilation volume (MVV) was carried out. The subjects were asked to inhale and exhale as deep and as fast as possible for 12 seconds. Three consecutive readings were obtained, out of which the best was noted.

Statistical Analysis

It was done using SPSS software (version 16.0). Results were expressed as mean ± SD. Students unpaired 't' test was used to compare the control and diabetic group subjects. Association of PFT parameters with HbA1c and duration of illness in type 2 diabetic patients were analyzed by applying Pearson's correlation coefficient.

Observations

Table 1 indicates the number of subjects included in the study, duration of diabetes and levels of glycosylated hemoglobin in the controlled (healthy subjects) and study group (type 2 diabetics). There was a significant increase in HbA1c in type 2 diabetic study group as compared to control group.

Table 1: Indicating Number of Subjects, Duration of Diabetes and HBA1c

	Control	NIDDM/Type 2 Diabetes Mellitus
No of subjects	72	72
Duration of diabetes	-	4.47± 1.82
HBA1c	5.11 ± 0.30	7.62 ± 1.03 (difference is significant)

Table 2 illustrates the anthropometric parameters in control group and type 2 diabetics. No significant difference was observed between the two groups for age, height, weight and BMI. BMI of all the subjects in the study was below 25.

Table 2: Comparison among study Groups for Anthropometric Parameters

Parameters	Control Mean ± SD	NIDDM/ Type 2 Diabetes Mellitus Mean ± SD	P Value	Test of Significance
Age	48.10 ±5.62	48.54±4.78	0.227	Not significant
Height	162.57±6.38	162.11±5.94	0.453	Not significant
Weight	56.54±4.77	56.07±6.99	0.204	Not significant
BMI	21.64±2.27	21.65±3.30	0.084	Not significant

Table 3 shows mean ± SD of the fasting and postprandial blood glucose levels in the controlled and type 2 diabetic subjects. There was a significant increase in both the fasting and post-meal glucose levels in the type 2 diabetic subjects.

Table 3: Comparison of Fasting and Post Meal Blood Sugar Levels among Study Groups

Parameters	Control Mean ± SD	NIDDM/ Type 2 Diabetes Mellitus Mean ± SD	Unpaired T Test	P Value	Test of Significance
Fasting blood sugar	83.79 ± 6.50	97.54 ± 11.50	8.831	0.000	Diff is Sig
Post Meal Blood Sugar	127.93 ± 9.85	171.42 ± 14.60	20.949	0.000	Diff is Sig

Table 4 shows mean ± SD of the pulmonary function parameters in the control and type 2 diabetic subjects. There was a significant decline in FVC, FEV_1 and $FEV_{1\%}$ in type 2 diabetic subjects as compared to control subjects. The preserved ratio of FEV_1/FVC% indicates a restrictive type pulmonary dysfunction. There was no significant difference in MMEFR $_{25\text{-}75\%}$, MEFR $_{0.2\text{-}1.2\ L}$, PEFR and MVV in type 2 diabetic subjects as compared to controlled subjects.

Table 4: Comparison among Study Groups for Pulmonary Function Tests

Parameters	Control Mean ± SD	NIDDM Mean ± SD	Unpaired T Test	P Value	Test of Significance
FVC	2.78 ± 0.32	2.58 ± 0.33	3.643	0.000	Diff is Sig
FEV1	2.37 ± 0.29	2.11 ± 0.27	5.503	0.000	Diff is Sig
FEV1%	84.18± 3.26	82.22± 3.44	3.499	0.001	Diff is Sig
MMEFR25-75%	3.29 ± 0.71	3.18 ± 0.37	1.240	0.217	Diff is not Sig
MMEFR.2-1.2L	5.77 ± 0.77	5.62 ± 0.70	1.219	0.225	Diff is not Sig
PEFR	7.40 ± 0.72	7.37 ± 0.77	0.258	0.797	Diff is not Sig
FEV3	2.66 ± 0.34	2.63 ± 0.33	0.620	0.536	Diff is not Sig
MVV	98.49 ± 10.88	96.25± 10.52	1.254	0.212	Diff is not Sig

Table 5 indicates correlation of PFT parameters with duration of diabetes and HbA1c in type 2 diabetics. All the PFT parameters showed a positive correlation with both the duration of diabetes and glycosylated hemoglobin.

Table 5: Correlation of PFTs with Duration of Diabetes and HBA1c

Duration of diabetes				Glycosylated haemoglobin (HBA1c)			
Parameter	**Pearson Correlation**	**P Value**	**Correlation is**	**Parameter**	**Pearson Correlation**	**P Value**	**Correlation is**
FVC	-0.807	0.000	Significant	FVC	-0.810	0.000	Significant
FEV1	-0.763	0.000	Significant	FEV1	-0.773	0.000	Significant
FEV1%	0.285	0.015	Significant	FEV1%	0.252	0.033	Significant
MMEFR25-75%	-0.155	0.000	Not Significant	MMEFR25-75%	-0.066	0.583	Not Significant
MMEFR.2-1.2L	-0.397	0.193	Significant	MMEFR.2-1.2L	-0.313	0.008	Significant

PEFR	-0.525	0.000	Significant	PEFR	-0.418	0.000	Significant
FEV3	-0.485	0.000	Significant	FEV3	-0.477	0.000	Significant
MVV	-0.455	0.000	Significant	MVV	-0.484	0.000	Significant

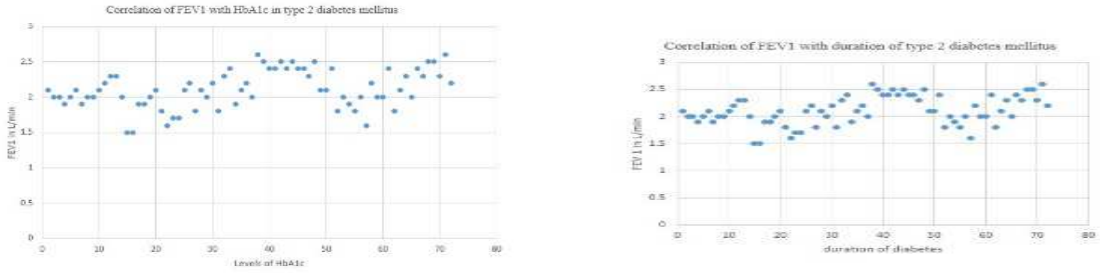

Figure 1

DISCUSSIONS

In the present study, we observed that there was a significant decrease in FVC, FEV_1 and $FEV_{1\%}$ in type 2 diabetic patients when compared with the healthy controls, whereas the other PFT parameters, $MMEFR_{25\text{-}75\%}$, $MMEFR_{0.2\text{-}1.2L}$, PEFR and MVV did not show significant changes when compared to the control group. The decrease in $FEV_{1\%}$ in type 2 diabetics in our study suggested that the impairment of pulmonary functions was primarily restrictive in nature.

In a meta-analysis, van den Borst, B. pooled the data of 40 studies and concluded that there is a moderate, but statistically significant, impaired lung function, which tends towards a restrictive pattern in diabetes mellitus and which was more pronounced in type 2 diabetes.[6] A similar decline in FVC and FEV_1 have been reported by the authors who have conducted studies in NIDDM subjects.[7, 8, 9, 10] However, the Rancho Bernardo Study refuted the association of NIDDM with pulmonary function. This might be due to the inclusion of small number of subjects in the study with severe diabetes or those with diabetes of prolonged duration. The study recommended the need to conduct more epidemiological studies to provide further information about the relationship between NIDDM and lung function.

All the type 2 diabetic subjects in the study group had a high level of fasting and postprandial blood glucose levels and increased levels of glycosylated hemoglobin as compared to the control group subjects. Levels of glycosylated hemoglobin in type 2 diabetics was 7.62 ± 1.03, which indicates poor glycemic control. There was a significant correlation of all PFT parameters, except $MMEFR_{25\text{-}75\%}$, with HbA1c and duration of diabetes.

Previous studies assessing the relationship between blood glucose control and pulmonary function have reported results which are not consistent.[11] However, in the Fremantle diabetes study, Davis TM *et al.* observed reduced lung volumes and airflow, which he stated was likely due to chronic complications of type 2 diabetes and the severity may be related to glycemic exposure. The study concluded that the declining lung function measures could be consistently predicted by poor glycemic control in the form of a higher mean HbA1c, follow-up HbA1c, or follow-up of fasting plasma glucose.[12] Also, A. Mohd. Khan *et al.*[13] in his study on diabetic patients, found profound impairment in pulmonary function with duration of diabetes, especially after 10 years and suggested that lower FVC and $FEV_1/FVC_{\%}$ than predicted may be related to poor glycemic control, which persisted due to longer duration of diabetes. Similar findings were also found by A. Kaparianos *et al.*[14] and M. Erfan *et al.* [15] in their study

of pulmonary functions in diabetes mellitus.

The duration of diabetes in type 2 diabetic subjects in our study was 4.47± 1.82 years. Higher levels of HbA1c and fasting and post meal blood sugar levels in the study are suggestive of poor glycemic control in the study group population. Also, in type 2 diabetes mellitus, unlike type 1 diabetes, where there is acute onset of insulin deficiency, the exact onset of diabetes cannot be predicted. Various studies were carried out to study the association of duration of diabetes and spirometric measurements have established the existence of strong positive correlation with duration of diabetes than with metabolic control.[16, 17]

With longer duration of diabetes, the hyperglycemia may linger for a greater length of time, and this may likely increase the possibility of diabetes, affecting both the microvascular and macrovascular tissue.

Lung has abundant connective tissue and this may increase the possibility of it getting affected by hyperglycemia and thereby its inclination for non-enzymatic glycosylation of its tissue proteins. Collagen is the major connective tissue of the lung parenchyma and both qualitative and quantitative abnormalities in collagen can cause restrictive pulmonary disease(18). The normal elastic and complaint properties of the lung require that all the connective tissue elements work in harmony and in proper spatial orientation with one another. The strength and stability of the connective tissue is provided by the cross-link formation of both collagen and elastic components and the 'stocking mesh 'arrangement of these fibers.[19, 20, 21] In diabetes mellitus, one of the major mechanisms to interfere with connective tissue crosslink is the presence of increased non-enzymatic glycosylation of lysine or hydroxylysine residues due to prolonged exposure of connective tissue proteins (collagen/elastin) to hyperglycemia resulting in impairment of mechanical properties of the lung.[20]

Histopathologic evidence of lungs in diabetic subjects have revealed thickened alveolar, capillary and pulmonary arteriolar walls and with passage of time, these changes in the lungs become a cause of decrease in diffusion capacity, pulmonary dysfunction and lung function impairment.[21, 22,23] In the present study, it was not possible to conduct diffusion studies due to practical difficulties.

Other possible contributory factors for lung impairment can be glycation of chest wall and bronchial tree proteins, autonomic and phrenic neuropathy resulting due to diabetes, thereby causing alterations in bronchial reactivity and respiratory muscle function[24] and an increased inclination to respiratory infections.[25] Also, it is known that surfactant is secreted by type II epithelial cells [26] and experimental studies in rat lung indicate that the granular endoplasmic reticulum are most dependent on insulin for normal metabolic functions.[8]

Lung has an extensive capillary bed and so it is likely to be affected by diabetic microangiopathy. The epithelial and capillary basal lamina of alveoli are significantly thicker in diabetics.[19, 27] Another mechanism whereby diabetes might be expected to worsen pulmonary function is atherosclerosis.[28]

Thus, various factors may contribute to decreasing the pulmonary compliance.

Though the findings in the study (decrease in FVC, FEV_1 and $FEV_{1\%}$) may not be clinically relevant under stable conditions, but the impairment of pulmonary functions is indicative of loss of pulmonary reserves, which may be a problem in conditions of increasing pulmonary demand like lung infection to which diabetic population is known to be more prone.

CONCLUSIONS

The present study revealed significant decline in FVC, FEV_1 and $FEV_{1\%}$ (restrictive type) in type 2 diabetic patients, which may be due to the non-enzymatic glycosylation of collagen in the lung tissue, microangiopathy and alteration in respiratory muscle function. Duration of diabetes and HbA1c levels are the major determining factors of lung pathology.

SUGGESTIONS

It would be advisable for diabetic patients to undergo periodic spirometry test along with glycosylated hemoglobin which can be helpful to identify the susceptible diabetic patients. There is scope for further work wherein the study can be extended by including diffusion studies as part of the protocol, which could not be done due to unavailable resources.

REFERENCES

1. *King et al., Global burden of diabetes 1995 to 2025. Prevalence, numerical estimates and projections. Diabetes Care 1998; 21:1414-31.*
2. *Baum G. K. and Wolinsky, E. Textbook of pulmonary diseases 5th edition, edited by 1994; 2: 1649–1650.*
3. *Nathan et al.. The clinical information value of the glycosylated hemoglobin assay. N. Engl. J. Med. 1984; 310: 341-6.*
4. *Teitz, N. M. and Trunder, P. Estimation of blood glucose. Clinical guide to laboratory test Souders, W. B., 1976; 238.*
5. *Standardization of spirometry, 1994 update. American Thoracic Society. Am. J. Respir. Crit. Care Med. 1995; 152: 1107–36.*
6. *Borst et al. Pulmonary function in diabetes: a meta-analysis. Chest. 2010; 138 (2): 393–406.*
7. *Asanuma et al. Characteristics of pulmonary function in patients with diabetes mellitus. Diab. Res. Clin. Pract. 1985; 1: 95–101.*
8. *Lange et al. Diabetes mellitus, plasma glucose and lung function in a cross-sectional population study. Eur. Respir. J. 1989; 2: 14–9.*
9. *Boulbou et al. Diabetes mellitus and lung function. Med Princ. Pract. 2003; 12: 87–91.*
10. *Rao, Y. S., & RAO, V. D. (2016). Prevalence of Periodontitis among patients with Type-2 Diabetes Mellitus. Int J Gen Med Phrar, 5(2), 15–22.*
11. *Cazzato et al. Lung Function in Children With Diabetes Mellitus. Pediatr. Pulm. 2004; 37:17–23.*
12. *Davis et al.: Reduced pulmonary function and its associations in type 2 diabetes: the Fremantle Diabetes study. Diabetes Care 2004; 27: 752–7.*
13. *Davis et al. Reduced pulmonary function and its association in type 2 diabetes: The Fremantle diabetes study. Diab. Res. Clin. Pract. 2000; 50:153–9.*
14. *Khan et al. FVC, FEV1 and FEV1/FVC% in type-1 diabetic male and their relationships with HbA1c. J. Bangladesh Soc. Physiol. 2012; 7(1): 23–28.*
15. *Kaparianos et al., Complications in diabetes mellitus. Chron. Resp. Dis. 2008; 5: 101–108.*
16. *Irfan et al., Pulmonary functions in patients with diabetes mellitus. Lung India 2011; 28: 89–92.*
17. *Harshitha, S. H., & Neelambikai, N. (2016). Effect of Posture on Peak Expiratory Flow rate. International Journal of Pharmacology And Physiology: Applied, 2(1), 19–22.*
18. *Barret, C. E. and Frette, C. NIDDM, impaired glucose tolerance and pulmonary function in older adults. The Rancho Bernardo Study. Diabetes Care 1996; 19: 1441–1444.*
19. *Aparna. Pulmonary Function Tests in Type 2 Diabetics and Non- Diabetics People - A Comparative study. J. Clin. Diagn. Res. 2013 Aug; 7(8): 1606–1608.*
20. *Innocenti et al., Indications of reduced pulmonary function in type 1 (insulin dependent) diabetes mellitus. Diab. Res. Clin. Prac. 1994 Oct; 25(3): 161–8.*
21. *Hansenet al., Pulmonary complications in diabetes mellitus. Mayo Clin. Proc. 1989; 64: 791–9.*
22. *Ramirez et al. . Relationship between diabetes control and pulmonary function in insulin dependent diabetes mellitus. Am. J. Med. Oct 1991; 91: 371–376.*
23. *Vracho et al., Basal lamina of alveolar epithelium and capillaries: Quantitative changes with ageing and in diabetes mellitus. Am. Rev. Respir. Dis. 1979; 120: 973–979.*
24. *Sandler M. Is the lung target organ in diabetes mellitus? Arch. Intern. Med. 1990; 150: 1385–8.*

25. *Matsubara T and Hara F., The pulmonary function and histopathological studies of the lung in diabetes mellitus. Nippon Ika Daigaru Zasshi 1991 Oct; 58(5): 528–36.*
26. *Singh, S., Bigoniya, P., Shrivastava, B., & Sharma, J. (2016). Hypoglycemic Profile of Gymnemic Acid and Glycyrrhizic Acid on High Fructose Diet Related Obesity Induced Diabetes. International Journal of Medicine and Pharmaceutical Science (IJMPS) ISSN (P), 2250-0049.*
27. *Villa et al.: Bronchial reactivity in diabetic patients: relationship to duration of diabetes and degree of glycemic control. Am. J. Dis. Child 1988; 142: 726 –729.*
28. *Fleming et al., Disease concurrence in diabetes mellitus: a study of concurrent morbidity over 12 months using diabetes mellitus as an example. J. Epidemiol. Commun. Health 1991; 45: 73–77.*
29. *Plopper, C. G. and Morishige, W. K. Alterations in granular (type 2) pneumocyte ultrastructure by streptozotocin induced diabetes in the rat. Laboratory Investigations 1978; 38: 143.*
30. *Laurent, G. J., Lung collagen; more than scaffolding. Thorax 1986; 41: 418–428.*
31. *Lyons, T. J., Lipoprotein glycation and its metabolic consequences. Diabetes 1992; 41 (Suppl. 2): 67–73.*

AUTHOR'S PROFILE

Dr SonaliPande is presently working as Associate Professor in Physiology at TN Medical College & BYL Nair ch Hospital, Mumbai, India. She has done her graduation and post graduation in the discipline of Physiology from the prestigious institute of Indira Gandhi Medical college, Nagpur, India. She was associated with her work in pulmonary physiology laboratory in her post graduate days. Dr Sonali, has been and is a principal guide to many post graduate students. She has successfully submitted several university dissertations some of which include detailed study on autonomic function tests in iron deficiency anaemic patients, in those consuming caffeine, also in those practising deep meditation techniques of Sudarshankriya and Padmasadhana. She has presented papers at National conference" APPICON, AFMC, Pune and at Staff research committee, delegated lecture at CME. She has six publications in peer reviewed journals to her credit. She is life member of Indian Journal of Physiology and Pharmacology

Dr ArunChutani is presently pursuing his Residency in Internal Medicine at Mercy St Vincent Medical Center, Toledo, Ohio. After graduating from Mahatma Gandhi Medical College and Hospital in Jaipur, India, he served as Junior Resident in the Department of Microbiology and Immunology, S.M.S Medical College and Hospital, Jaipur where he worked in Stem Cell Research Laboratory and acquired hands on experience in Molecular diagnostic techniques (CONVENTIONAL AND REAL TIME P.C.R.) as an aid to diagnosis of bacterial and viral infections. In his earnest quest to understand medicine to his core, Dr ArunChutani went on to study his post graduation in the discipline of Physiology in one of the most prestigious Institute in India at Seth G S Medical college.Hewas intimately associated with Neurophysiology laboratory and particularlythe Sleep medicine laboratory in his post graduate years. Dr ArunChutani was honoured with the distinguished "DHARANI AWARD for First position in M.D. Physiology in Seth G.S. Medical College& K.E.M Hospitaland also awarded with the Vice Chancellor's Certificate of Merit for securing Second position in Physiology in MAHARASHTRA UNIVERSITY OF HEALTH SCIENCES (M.U.H.S.), India. He did his Senior Residency from TN Medical college, Mumbai, India and here too he was actively associated with various ongoing research projects in Physiology. He has nine publications in peer reviewed journals to his credit. He has presented papers/ poster at national conferences in NIMHANS, Bengaluru, India and APPICON and is a life member of Indian Journal of Physiology and Pharmacology. Also, Dr ArunChutani is an instructor and faculty at the Largest International N.G.O. 'ART OF LIVING' foundation in India.